# Art. XI.—*Description of two new Species of Australian Land Leeches, with Notes on their Anatomy.*

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(Plates XV., XVI.).

(Communicated by Professor Baldwin Spencer).

[Read 13th October, 1898.]

In a previous paper communicated to this Society, I described the anatomy of *Philæmon pungens*, a land leech found, so far as is yet known, in Victoria, New South Wales and Tasmania.[1]

In his memoir on the leeches of Japan, Professor Whitman refers to an Australian land leech sent to him by Professor Haswell, and says :—

"The Australian species, for which I am indebted to Mr. Haswell, differs from all other species that I have thus far examined in having only two jaws. The latero-ventral jaws are present, but the median dorsal jaw is entirely absent. This remarkable distinction, taken together with the fact that the genital orifices are separated by seven and a half rings instead of five, as in the case of most other land leeches, seems to make necessary the establishment of a new genus, for which I propose the name Geobdella."

There has been apparently no description published of this species referred to by Whitman. *Philæmon pungens* differs from the above in that it has four annuli to a segment and the reproductive orifices are separated by four rings. Through the kindness of Mr. T. Steel and Mr. C. French, I have recently had the opportunity of examining two other forms of land leeches ; the first of these which came into my hands agreed with *Philæmon pungens* in the presence of two jaws, but differed from it in possessing five annuli to the segment, and in having seven annuli between the pores.

[1] Proc. Roy. Soc. Vic., N.S., vol. x., 1898, p. 211.

The second, apart from external colour markings, differed only from the latter in having seven and a half annuli between the openings. These two are evidently more closely allied to one another than either is to Philæmon, and the three are sharply marked off from other leeches by the presence of two jaws.

There can be little doubt that the one with seven-and-a-half annuli between the pores is identical with the one referred to the genus Geobdella by Whitman, and for this I propose the name of *G. whitmani* [Fig. 2.]

The form with seven annuli between the pores is evidently closely allied to, though distinct from this, and for it I propose the name of *G. australiensis* [Fig. 1.]

The descriptions of these are as follows :—

## Geobdella whitmani, n. sp.

Total length in alcohol upwards of 40 mm. The number of annuli, including those represented at the anterior end by the four oculiferous rings, is 95. The first complete annulus is the 5th, and the last complete the 92nd.

Eyes, five pairs, first four in front of the first distinct annulus, the fifth on the 7th annulus, and separated from the fourth by two annuli.

Nephridial pores open on the last annulus of the segment, the first are in front of the fifth eye, and the last underneath a prominent papilla as in Philæmon, in this case formed by the 93rd and 94th annuli.

The male reproductive opening is between the 29th and 30th, and the female in 37th annulus.

Colour markings. Body warm rusty brown, dorsally there is a more or less distinct light band edged by a dark line, and on either side are patches of darker pigment. In each of these is a light band and occasionally these lighter bands may be continuous with one another, forming on either side a lateral band which may run along the greater part of the length of the body. The dorsal band does not usually extend along the posterior sixth of the body, which is here mottled with dark patches.

Segs. I.–III. have no clearly marked annuli, and bear the first three pairs of eyes.

Seg. IV. consists of 3 annuli, the most anterior bearing the fourth pair of eyes.

Seg. V. also consists of 3 annuli, on the first of which is developed the fifth pair of eyes.

Seg. VI. is represented by 3 annuli, 10, 11, 12, the first bearing segmental organs.

Seg. VII. and succeeding segments to XXII. consist of 5 annuli, the first always bearing well-marked segmental organs.

Segs. XXIII.–XXXIII. are represented by the 93rd, 94th, 95th annuli and the acetabulum.

Habitat. Woombye, Queensland (C. French, Esq.); New South Wales (Professor Haswell).

### Geobdella australiensis, n. sp.

Total length in alcohol upwards of 48 mm. The total number of rings is 95, this includes those indistinctly marked at the anterior end but represented by eyes [Fig. 1.]

The first complete annulus is the fifth, and helps to form the ventral lip of the anterior sucker; the last complete annulus is the 92nd.

Five pairs of eyes—the first three pairs undoubtedly represent the first three segments, consisting of only one annulus each, but these are not distinguishable. The fourth pair is borne on the 4th annulus, which is marked off from the 5th but not from the 3rd. The fifth pair is separated from the fourth by two annuli and is carried in the 7th annulus.

Nephridial pores open on the last annulus of the segment and can be easily detected along the white lateral line in every 5th annulus. The first are in front of the fifth eye, and the last under a papilla close to the acetabulum and formed by the 93rd and 94th annuli.

The male reproductive opening lies between the 29th and 30th annuli, and female between 36th and 37th.

Colour markings—alcohol specimens. The anterior portion of the body (about 1–39 annuli), a dull brown, posterior to this bluish-black. Along each side, separating the dorsal from the

ventral surface, is a distinct, white, lateral line, along which the nephridia open, a pair in each segment.

At the posterior end certain white patches occur on the dorsal surface which seem to be constant.

On the 85th and 86th annuli on each side of the mid-dorsal line is a small oval patch of white nearer to the lateral line, and extending into the 84th is a similar area, and continuing this posteriorly from the 89th to the 92nd is a white line. On either side of the median line is a diamond-shaped area extending from the 90th into the 89th and 91st annuli. A triangular patch occurs at the extreme posterior end, the apex being in the mid-dorsal line of the 93rd annulus and the base along the 95th.

Segs. I.–III. are indistinguishable, but are represented by the first three pairs of eyes which, however, are not borne on separate annuli.

Seg. IV. represented by 4th, 5th and 6th annuli, bears the fourth pair of eyes on an annulus not separated from segment III.

Seg. V. consists of 7th, 8th and 9th annulus, the fifth pair of eyes being on the 7th annulus.

Seg. VI. consists of 10th, 11th and 12th annuli, the most anterior of these bearing the segmental sense organs.

Segs. VII.–XXII. consist of five annuli each; the first annulus always carries the segmental sense organs, and on the last opens the nephridiopore.

Segs. XXIII.–XXXIII. are represented by the last three rings, 93, 94, 95, and the acetabulum as seen by the ganglia.

There are in this form ten segmental sense organs on the most anterior annulus of each segment, six on the dorsal side of the lateral line, and four on the ventral. Of the three dorsal pairs the middle one corresponds to the eye and the outer pair is placed close to the lateral line. Of the two ventral pairs the outer pair is nearer to the mid-line than in the case of the dorsal.

Habitat. Moss Vale, New South Wales (T. Steel, Esq.).

### *Anatomical Notes.*

With regard to the anatomy of these new forms, in the main they resemble *Philæmon pungens*. There are, however, certain points to which attention may be called.

I. *Alimentary Canal.*—In segment XVIII. as in Philæmon the eleventh pair of diverticula are given off and extend backwards through segments XIX., XX., XXI., and XXII. The main part of the alimentary canal passes through the segments XIX. and XX. as a straight tube, but in segment XXI. from its ventral surface arises a very definite duct-like portion leading into the intestine. Where the main part is connected with the narrow duct a very definite cæcum is developed in both these forms but more especially in *G. australiensis.* The intestine passes back through the remaining segments and opens on the dorsal surface between the 95th annulus and the acetabulum. At the anterior end of the intestine in segment XXI. it is continued forward as a blind pouch in *G. australiensis* as far as the 78th annulus and in *G. whitmani* to the 83rd.

II. *Posterior Organs.*—In connection with the 11th diverticula are a pair of posterior organs in structure resembling closely those found in Philæmon.

The position, however, differs. Instead of lying in segment XIX. and in the mid-ventral line they lie in both *G. whitmani* and *G. australiensis* in segment XXI. and occupy a more lateral position.

The ducts from these organs pass back into the inner and almost extreme posterior surface of the diverticula, and on account of the organs being two segments further back, the ducts are shorter. They are also much wider and can easily be detected in a dissected specimen. The glands do not appear to possess any pigment in the longitudinal grooves.

III. *Salivary Glands.*—Connected with the jaws. These are exceptionally well developed in both these species, much more than in *Philæmon pungens.* They are arranged in five distinct groups [Fig. 5], some opening on the jaws between the denticles as in Philæmon, others opening directly into the buccal cavity. Of these there are three distinct masses connected with each jaw:

1. A dorsal mass which is the largest and made up of several lobules. This extends as far back as the anterior margin of segment X. [Fig. 5, 1.]
2. The ventral mass which lies about the same level is also lobulated [Fig. 5, 3.]

3. The lateral mass, which is much smaller than either dorsal or ventral glands, lies on the dorsal side in front of the buccal cavity, the ducts of which pass back and enter the jaw beneath the longitudinal muscles [Fig. 5, 4.]

In addition to these there is a large lobulated mass which is situated on the dorsal surface under (1). The ducts from this extend forward and open on the dorsal surface of the buccal cavity near to the angle of the jaw [Fig. 5, 2.] The remaining group is made up of much smaller glands, the cells of which are not arranged together in masses, nor do their ducts run together in groups. They open into the buccal cavity on all sides [Fig. 5, 5.]

All the salivary glands are made up of single more or less spherical cells, of granulated protoplasm. The nucleus is situated in the distal end of the cell and from the opposite end arises the duct, which is continued to open on the surface [Fig. 8.]

It is remarkable that each unicellular gland is connected with the exterior by its own duct, so that in many instances the ducts extend through several segments. By the contraction of the muscles of the jaws, the secretion is forced out between the denticles as soon as the bite is made.

The salivary glands are all well supplied with blood from the lateral blood vessel.

IV. *Œsophageal Glands.*—In the paper on *Philæmon pungens*[1] I have referred to racemose glands in the œsophagus, which I called the salivary glands; these I now prefer to call the œsophageal and to keep the name "salivary" for the unicellular glands just described.

The same description applies to the œsophageal glands of these species as to the glands of Philæmon, namely racemose, consisting of large clear cells, and opening almost directly on to the surface of the œsophagus [Fig. 9.]

V. Connected with the cirrus sac is a strong glandular development consisting of small unicellular glands, some of which open directly into the cirrus sac, and others on to the surface of the skin.

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[1] *L.c. supra.*

These are in all probability modified epidermic cells like those of the head. Each opens by its own duct. The glandular cells in this position are smaller than those of the salivary glands, and take the stains, such as Mayer's hæmalum, like the glands in the head, while the salivary glands take indigo rather than hæmalum.

## DESCRIPTION OF PLATES XV., XVI.

Fig. 1.—Diagram *Geobdella australiensis*, showing the number of segments, annuli, nerve ganglia, nephridiopores, and reproductive openings.

Fig. 2.—Diagram of *Geobdella whitmani*, showing the relation of the reproductive openings to the annuli.

Fig. 3.—Diagram of *G. australiensis*, showing the relation of the posterior organs to the alimentary canal, and the intestine with its cæcum.

Fig. 4.—Diagram of *G. whitmani*, showing diverticula, intestine and posterior organs.

Fig. 5.—Diagrammatic representation of the salivary glands, showing their relation to the jaws and the buccal cavity on the right side of the nerve cord. 1. Large dorsal mass opening on surface of the jaw. 2. Dorsal mass opening into the buccal cavity. 3. Ventral mass opening on the surface of the jaw. 4. Small dorsal anterior mass opening on the surface of the jaw.

Fig. 6.—Transverse section through *G. whitmani* (camera lucida), showing the position of the salivary glands. Gl. 1. Dorsal gland opening on the jaw. Gl. 2. Dorsal gland opening into buccal cavity. 3. Ducts of the ventral salivary glands opening on the jaws. B.v. Lateral blood vessel. Neph. Nephridium 1.

Fig. 7.—Transverse section across *G. whitmani* (camera lucida) at the level of the pharynx passing into the œsophagus. Ph. pharynx wall. Œs. gl. œsophageal gland. Gl. 1. dorsal salivary gland opening on the jaw. D. 1. ducts of dorsal salivary gland connected with the jaws. D. 2. ducts of salivary gland (Gl. 2) to open

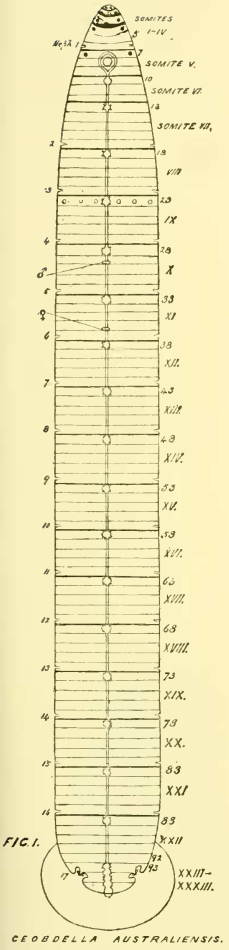


FIG. 1.

CEOBDELLA AUSTRALIENSIS.

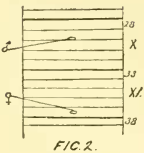


FIG. 2.

C. WHITMANI.

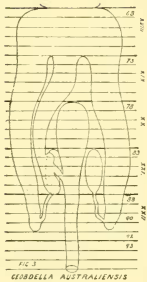

FIG 3

CEOBDELLA AUSTRALIENSIS.

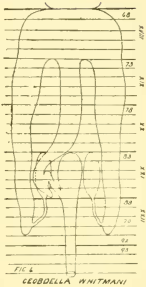

FIG 4

CEOBDELLA WHITMANI

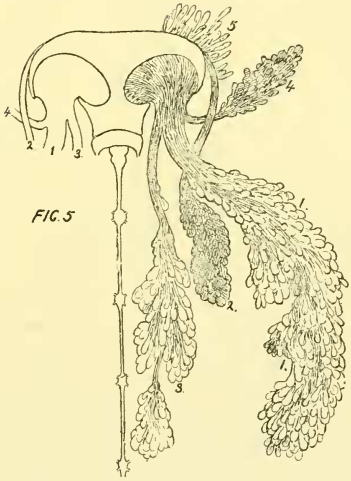


FIG. 5

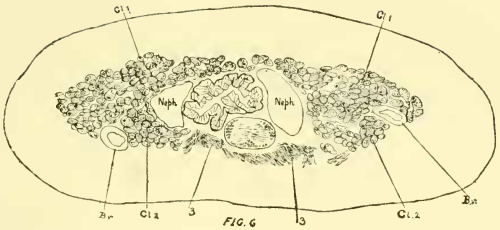


FIG. 6

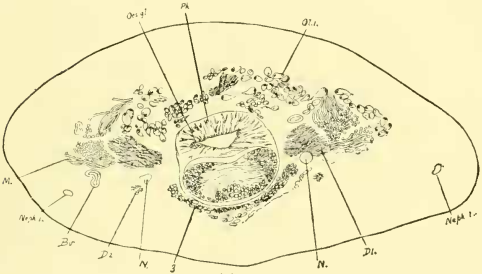


FIG. 7.

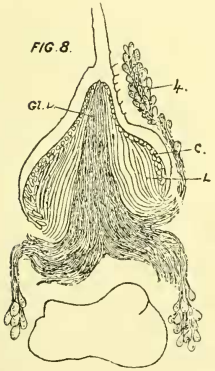


FIG. 8.

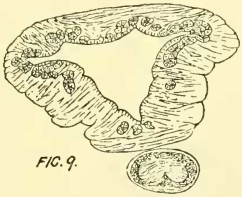

FIG. 9.

into the buccal cavity. 3. ventral salivary glands connected with jaws. B.v. lateral blood vessel. Neph. excretory duct leading to nephridiopore of the first pair of nephridia. M. longitudinal muscles of the jaws continued into the body wall. N. nerve arising from a ventral ganglion.

Fig. 8.—Longitudinal vertical section through the jaw showing Gl. d. mass of gland ducts made up those from Gl. 1, Gl. 3, Gl. 4. 4. salivary gland on the dorsal surface anterior to the buccal cavity. L. longitudinal muscles of the jaws. C. circular muscles of the jaws.

Fig. 9.—Transverse section through the œsophagus to show the œsophageal glands.